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ABSTRACT

Three term analysis (a format for viewing a student in relation to other people and to the physical environment) is proposed as a way of providing teachers (including those of the handicapped) with a vehicle for viewing all behavior and recording all aspects of the planning process. S. Sapon's behavioral formulations are presented followed by a discussion of how they can be used in various aspects of program planning and implementation. Included in the discussion is the application of three term analysis to observing and recording behavior, specifying objectives, analyzing tasks, designing educational strategies, and evaluating an educational activity. The elements in Sapon's Basic Principle for the Description of Behavior are defined as the environment immediately antecedent to a set of movements (or Setting), what a person does (or Movement), and the environment immediately following the set of movements (or Subsequence). A strategy for teaching a child to draw a straight line is used to illustrate the format. (SBH)

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Three Term Analysis: Continuity from Initial Assessment Through Program Revision

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Paper presented at 57th Annual Convention
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Three Term Analysis: Continuity from Initial Assessment Through Program Revision

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Three term analysis is a framework for describing behavior which is both systematic and flexible. It provides a format for viewing a student in relation to other people and to the physical environment, and in this way, represents a system for the analysis of those interactions which are intrinsic to teaching. Teachers, especially of handicapped individuals, must not only become aware of the effects of their behavior on their students, but must also learn to analyze this information systematically and utilize it for program planning.

Program planning entails the analysis of assessment data, the specification of objectives, the design of educational activities, and the evaluation of those activities based on data acquired during program implementation. The authors contend that many of the difficulties related to teaching effectiveness and efficiency begin during program planning and are further compounded during implementation. Some of the problems which arise seem to be related to the following:

1. not perceiving and/or utilizing all vital information about a student's behavior which becomes available during assessment and/or program implementation;
2. not including all aspects of the conditions under which a behavior is expected to be displayed when specifying objectives;
3. one objective-one activity teaching;
4. "on-going" evaluation which in actuality is not immediate, continuous, or consistent;

5. utilizing different formats for the orthographic (written) products associated with each step in the planning process.

In short, much instructional programming lacks an underlying theoretical base which ties all parts of the process together.

In this paper, three term analysis is proposed as a way of avoiding some of the problematic areas mentioned above by providing the teacher with a vehicle for viewing all behavior and recording all aspects of the planning process. It affords a teacher a unique continuity from initial assessment to on-going evaluation and modification of educational activities. As a way of integrating objectives from the various skill areas, three term analysis enables a teacher to plan and implement activities which contribute to the achievement of objectives in more than one skill area.

Three term analysis represents a basic theoretical construct of the Descriptive Analysis of Behavior, the name given to the behavioral formulations of Stanley M. Sapon (1973a, 1973b, 1976). Although the Descriptive Analysis of Behavior acknowledges the same Skinnerian origins as other behavioral approaches and is based on many of the same principles, differences can be identified in terminology, their definitions, and on the emphasis Sapon places on descriptive detail. While Sapon's formulations and their application may appear tedious to the beginner, the coherent understanding of behavior which results from carefully studying them will more than offset the time initially invested.

Sapon's conceptualization of behavior has provided the basis for the clinical and educational program at the University of Rochester's Verbal Behavior Laboratory for the past decade. The authors have been involved in teaching this approach to students enrolled in graduate-level teacher training

programs at their respective institutions. This paper represents an effort to synthesize these experiences with those the authors learned as teachers in the Verbal Behavior Laboratory.

In this paper, Sapon's formulations will be presented followed by a discussion of how they can be used in various aspects of program planning and implementation. Included in the discussion will be the application of three term analysis to observing and recording behavior, specifying objectives, analyzing tasks, designing educational strategies, and evaluating an educational activity.

BEHAVIORAL FORMULATIONS

As the name implies, three term analysis is concerned with three discrete but related elements. Sapon (1973b:6) summarizes these elements in his Basic Principle for the Description of Behavior:

> In some environment (SETTING)
> a MOVEMENT is displayed, which is followed by
> changes in the environment (SUBSEQUENCE).

Written in another way, this statement clearly identifies the three terms in a three term description, namely:

The environment immediately antecedent to a set of movements	What a person does	The environment immediately following the set of movements
or	or	or
SETTING	MOVEMENT	SUBSEQUENCE

Within this basic framework, observed behavior is recorded, program objectives are specified, tasks are analyzed, strategies are delineated and activities

(programs) are evaluated. Before we can discuss its uses and advantages in each of these aspects of programming, we must define each of the terms and how they are related to one another.

It will facilitate the reader's understanding if we begin our discussion with the middle term, what Sapon calls the movements. Movements, not surprisingly, refer to observable movements --how people move their arms, legs, hands, feet, head, face, mouth, in short, any moveable part of the body. Descriptions of movements can be very simple, such as "Child nods head" or more complex, involving several parts of the body simultaneously, such as "Child directs eyes at doorknob, takes one step forward, and extends left arm." The level of detail included in the description of the movements will vary, depending on the student involved and the specific function of the description in the programming process.

The remaining two terms in three term analysis refer to the environment in which a person moves, that is, to the environments which precede and follow movements. Sapon calls these environments the setting and subsequence respectively. The setting, then, can be defined as the environment antecedent to a set of movements, the subsequence, as the environment subsequent to a set of movements. The reader's attention is brought to the fact that when we talk about settings and subsequences we are talking about <u>environments</u> rather than stimuli or consequences. That is, both settings and subsequences (antecedent and subsequent environments) represent a <u>composite</u> of physical, behavioral, and temporal properties which exist or occur before and/or after movements are displayed. Examples of physical properties of settings and subsequences include objects which are present, persons which are present, and the spatial relationships between the objects and persons. Movements displayed by people

in the setting and subsequence and the things which they say represent behavioral properties of the environment. Temporal properties refer to the time in which a behavioral event takes place, the events it precedes or follows, the length of its occurrence, etc. A fourth element of the environment which is relevant to the movements displayed relate to historical factors, that is, the behavioral history of a person relative to specific environmental properties. This attention to a multitude of environmental properties is a distinguishing characteristic of Sapon's three term analysis and is directly related to the kinds of objectives and teaching strategies which can be formulated based upon three term descriptions.

To facilitate descriptions of settings and subsequences we generally break each of them down into two components. In describing settings, teachers need to be aware of vocal properties, that is, what other people in the environment say, and non-vocal properties, that is, what the other people do, how teaching materials are arranged, etc. In discussing subsequences, we need to attend to both natural subsequences and arranged subsequences. Natural subsequences are "environmental changes which immediately and inevitably follow a bit of movement" (Sapon, et al., 1976, 27). For example, the appearance of the numeral 4 is a natural subsequence to a child holding a pencil and displaying certain writing movements. Being next to the teacher is a natural subsequence to a child walking across the room when the teacher is on the other side of the room. Arranged subsequences, on the other hand, must, by definition, include the behavior of another human being or else represent environmental changes which are arranged by another human being. For example, receiving a glass of milk at snacktime after saying "milk, please" represents an arranged subsequence to the child's utterance because it is a change in the environment

which is brought about by the intervention of a second individual (in this case the teacher). Natural subsequences always follow movements, whether a student is alone or in the presence of other people. Arranged subsequences, however, can only occur in the presence or as a result of a second person.

In summary, three term analysis constitutes detailed descriptions of each of the three terms: the setting, movements, and subsequences. Sapon (1972) emphasizes that while each of the terms may be examined independently, "we have not described a behavior unless we have described all three terms." Let's take the example of a teacher recording "Ricky said 'cookie' today." Does this statement fulfill the criterion of describing all three terms? If we attempt to write a three term description of it, we find that Ricky's movements are described (saying "cookie"), but the information provided on the setting and subsequence to those movements is minimal. We may assume that a person was in his setting, since someone apparently observed his utterance, but what else can we say about the environment? Was there a picture of a cookie in Ricky's setting, or an actual cookie? Was it snack time or lunch time? Or was Ricky in the bathroom or some other place when he said "cookie"? Was anything said to him before he spoke? That is, did someone model "cookie" or ask him a question such as "What do you see?" or "What do you want?" or "What did you eat yesterday?" What happened after Ricky's utterance? Was he given a cookie? Was he told "no that's not a cookie, that's a ____"? Clearly, the statement about Ricky lacks a great deal of information and does not fulfill the criterion for a three term description.

When discussing behavior, it is also important to remember that two behaviors can be considered the same only when all three terms of description are identical (Sapon 1972). In other words, if any term--the setting, movement,

or subsequence--in a line of behavior differs from a second line, the two behaviors are not equivalent. This is obvious in a comparison of the following two lines:

a)

SETTING	MOVEMENT	SUBSEQUENCE
Teacher & student sitting at table; array of 3 cards on the table: a black & white dog, a red apple, and a red wagon; teacher says: "Point to the dog."	Student points to the dog.	Student's finger in contact with picture of dog; teacher says: "That's right!"

b)

SETTING	MOVEMENT	SUBSEQUENCE
Teacher & student sitting at table; array of 3 cards on the table: a black & white dog, a red apple, and a red wagon; teacher says: "Point to the one that isn't red."	Student points to the dog.	Student's finger in contact with picture of dog; teacher says: "That's right!"

These two lines represent different behaviors because the settings (specifically the teacher's utterances) differ, even though the movements and subsequence are the same. The importance of this point in the teaching of handicapped persons cannot be overemphasized. All too often we expect a student to be able to do something because we had observed him display a similar set of movements in a different environment. When he does not meet our expectations we are disappointed and attribute his failure to lack of motivation, disobedience, or any of a host of negative reasons, thereby affecting our overall attitude towards this particular student. Yet if the behavior which the student had been observed to display and the behavior we are expecting him to display are examined closely, we may see that in actuality, we have been asking him to do something which he had never been called upon to do before. Our evaluation of his performance will most likely differ considerably with this knowledge.

Since behavior is actually a continuous display of movements in continually changing environments, the environment subsequent to one movement becomes the setting for the next. In this way a series of movements can be described as a "chain" of single lines of description. For example, the following is an analysis of self-feeding:

SETTING	MOVEMENT	SUBSEQUENCE
Man sitting at a table in front of a plate of food; fork on the table near plate	Man picks up the fork	Man with fork in hand
Man with fork in hand	Man spears carrot slice onto fork from plate	Man holding in hand a fork with a carrot slice on it
Man holding in hand a fork with a carrot slice on it	Man moves fork with carrot towards his mouth	Carrot slice in mouth; fork empty
Carrot slice in mouth; fork empty	Man returns fork to table	Fork on table; Man empty-handed

Note that in the above analysis the subsequence to one set of movements becomes the setting for the next set of movements.

Careful observation and analysis of many organisms' behaviors in various laboratories have enabled behavioral scientists to characterize the relationships between an organism's movements and its environment. Sapon (1972, 1976) formulated three behavioral laws which provide the framework for relating observed and described behavioral events to the prediction and control of future events. These relationships are relevant to our discussion because they provide the basis for the design of teaching strategies along with three term descriptions.

The Law of Setting (Sapon 1976: 20) states that:

> The setting controls the probabilities of the display of a set of movements.

In other words, the setting, seen as a complex of environmental properties,

is the occasion for, or increases the probabilities of a set of movements. For example, a drinking fountain in the corridor of an office building increases the likelihood that a passer-by will stop and take a drink of water. The presence of a working elevator or escalator in a building increases the probabilities of people riding to their destination and concurrently, decreases the probabilities of people walking up the stairs. Similarly, merchandisers try to affect the behavior of potential customers by arranging their store displays so as to increase the probabilities of people buying their products.

The Law of Subsequence (Sapon 1976: 18) states that:

> The environment subsequent to a set of movements changes (controls) the probabilities of the re-occurrence of that set of movements in the same setting.

As teachers, we are primarily interested in those subsequences which are observed to increase the probabilities of the re-occurrence of a set of movements. These subsequences enable us to make specific predictions about what a person will do the next time that setting occurs. For example, one year old Lowell is sitting on the floor of the family room with several toys and books nearby; his grandmother sits on the couch; they have just finished eating dinner. In this setting, Lowell toddles over to Grandma, climbs up next to her, and places a book in her lap. Grandma smiles broadly, picks up the book, says, "Oh! Would you like me to read some nursery rhymes?" and begins to read aloud. We observe that the next three times Lowell is in this setting, he walks to the couch, climbs up next to Grandma and places a book in her lap. The subsequence to these movements likewise remains the same.

We are now in a position to say that this subsequence--Grandma smiling, taking the book, and reading aloud to Lowell--has increased the probabilities of Lowell displaying the stated movements each time he is in the setting. We

are also in a position to predict that the next time Lowell is in that setting, he will with increasing probability display the same movements. This relationship between subsequences to movements and specificity of predictions should be of prime importance to educators since it is directly related to the question of the effectiveness and efficiency of punishment procedures.

The third law of behavior formulated by Sapon (1976: 113) is called the Law of Strength. It states that:

> The STRENGTH of a behavior (its probability of re-occurrence) depends upon the number of times that behavior has been displayed.

From this it follows that the more often a set of movements is displayed in a given setting, the more likely it becomes that the specific set of movements will be displayed again the next time the setting occurs. For example, the more times I move my hand towards the light switch to the left side of the door when standing in the dark in the doorway to my bedroom, the greater the likelihood that I will move my hand to the left of the door the next time I am in the setting of the doorway to my darkened bedroom.

In summary, the Law of Setting, Law of Subsequence, and Law of Strength describe the relationships between an individual's movements and the environments in which they are displayed. These relationships can be summarized by saying that properties of the setting and subsequence (including temporal properties) affect an individual's behavior. The implications for teaching should be apparent and will be discussed at length below.

OBSERVING AND RECORDING BEHAVIOR

Observing and recording behavior are important in all aspects of instructional programming; it provides the basis for assessment, specifying objectives, and designing and evaluating instructional activities. What a

teacher observes and how he records those observations can critically influence his teaching. For example, if a teacher observes a student display a certain behavior of note, but fails to write it down, the particular behavior displayed and the circumstances surrounding its occurrence may be forgotten when the teacher sits down to further plan a student's program. On the other hand, a particular record-keeping procedure should not be so structured that it is impossible to record behaviors which are unpredicted, simply because there is no appropriate place to write them down.

Three term analysis is useful for record-keeping because it provides structure to one's observations yet is sufficiently open-ended. As the reader might already expect, basic to the three term recording procedure is descriptive data concerning students' behaviors (settings, movements, and subsequences) in the teaching environment, especially in instructional activities. It is worthy of note that within the three term descriptive framework, good record-keeping does more than document student progress. Through analysis of settings and subsequences and their relationships to specific movements, data regarding both effective and ineffective teaching procedures is also revealed, yielding invaluable information when it comes time for instructional planning.

Observing and recording behavior in three terms can be accomplished in a number of ways depending upon the particular educational environment and the needs of a given teacher. The most simple type of three term recording is simply a sheet of paper with three columns under which the teacher writes descriptions of settings, movements and subsequences. This is, for example, a convenient way to record incidental teaching episodes which occur throughout the day, desirable behaviors which are particularly noteworthy, and undesirable behaviors which occur frequently (Figure 1).

NAME: Jeremy Kelly DATE: 10/12/78 12

Type Key: I (Incidental Teaching episode)
U (Undesirable behavior)
D (Desirable behavior)

TYPE	SETTING	MOVEMENT	SUbSEQUENCE
I	9:10 Teacher + J. standing at door to classroom; T stoops to J's eye level	J. directs eyes at T.	e.c. T: "What do you want me to open?" + model "door"
		J says "doh"	/doh/ T. opens door
U	J. sitting in chair in group (~ 10:00); T instructing other child	J. gets up, goes to sink + starts splashing water	J at sink T: "Come sit down + I'll give you a piece of candy.
		J. sits in chair	T gives candy
D	12:00 T. observing free play from near by.	J. walks up to T. + says "wan car"	T: "OK, come w/ me + we'll find the cars."
I	12:45 door to bathroom T says to J: "What do you want me to open?" + models "door"	J reaches for door knob	T. stoops down to eye level + says "What do you want me to open?" + lip model
		J. directs eyes at T.	e.c. T repeats ? with lip model
		J. says "doh"	/doh/; T opens door
U	2:10 J playing in group	J walks to sink + splashes water all over floor	T walks over to J takes him by hand + says, "Let's do some puzzles.

Figure 1
Record Sheet for Open-Ended Descriptive Observations

When a student displays desirable movements which are unexpected and therefore especially worthy of note, as teachers we want to know what environmental events preceded and followed those movements so we can provide further occasions for their display by arranging the environment in the same or similar way. On the other hand, we want to decrease the probability of undesirable behaviors; knowing the settings and subsequences in which they occur will help determine an effective strategy for doing so.

It is clearly unrealistic to expect a teacher to record in three terms every behavior which students display. However, the open-ended three term descriptive recording procedure can be particularly useful to a teacher when a student is having unusual difficulty achieving a particular objective. The procedure will help the teacher to informally assess a student's behavior by identifying those behaviors in a complex task which a student already displays and those which he does not. Donald is a good case in point. Donald's teacher, Ms. Donahue, gave him a worksheet with instructions to draw lines between the matching animals pictures on the paper. Donald's completed paper looked like this:

The teacher than gave Donald a second similar worksheet, and as she watched him complete it the second time, she recorded the behaviors he displayed in three terms (Figure 2). The data stands as a written record of those behaviors which were displayed correctly and those which require special attention. Teachers using this recording method have frequently found it helpful in

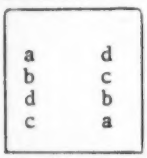
SETTING	MOVEMENT	SUBSEQUENCE
Donald, one other student and teacher sitting at table in corner of room; worksheet in front of Donald:  Pencil beside it; Teacher says, "Donald, I want you to draw lines between the matching animals."	Donald directs eyes at pencil and picks it up.	Pencil correctly held in Donald's right hand.
	Donald scans animals on paper and directs eyes to animal on left at top of page.	Eyes directed to upper left animal.
	Donald places pencil point near upper left animal & draws a circle around it.	Circle drawn around upper left animal.
	Donald scans right column and directs eyes to animal matching the upper left animal.	Eyes directed towards matching animal.
	Donald places pencil point near animal matching upper left figure, and draws a circle around it.	Circle drawn around animal matching upper left animal.
	Donald directs eyes to second animal in left column, and places his pencil near animal	Eyes directed at second animal in left column and pencil point near animal.
	Donald draws a circle around second animal in left column.	Circle drawn around second animal in left column.
	Donald scans right column and directs eyes to animal matching the second one in left column.	Eyes directed towards matching animal.
	Donald places pencil next to near animal matching the second one in left column and draws a circle around it.	Circle drawn around animal matching second figure in left column.

Figure 2
Three Term Record of Donald Completing a Worksheet

revealing patterns of teacher-student interactions which probably would have otherwise remained undetected.

Using the open-ended three term format is not always feasible, even if there are times when it would be desirable. For example, keeping three term records on a daily program might be facilitated considerably if a partially prepared record keeping format were used. A very complete description of the program is usually drawn up in advance and becomes a permanent reference so long as the program is being administered as part of a student's program (Figure 3). In addition, certain aspects of record-keeping can take place during the session so long as it does not interrupt the flow of the session, and additional notes can be written as soon after the session as possible (Figure 4).

Finally, there are occasions when it is either impossible or undesirable to keep records during an actual teaching episode (e.g., a teacher determines that recording during the lesson is the occasion for a student to display undesirable behaviors). In such cases, behavioral recording in a prose format can follow the lesson. However, it is critical to remember to include descriptions of settings and subsequences in addition to descriptions of the movements displayed (Figure 5).

SPECIFYING OBJECTIVES

Goals and objectives determined on the basis of assessment data can also be specified using the three term format. The framework provides space for describing the movements which are targeted and the conditions in which these movements are to occur (setting and subsequence). Examples of objectives in three terms appear in Figure 6. Note that objectives may be either a single line of description or multiple lines, and may be written in three term format or prose.

PROGRAM RECORD SHEET

PROGRAM NAME: "What's this?"

CHILDREN: Nancy & Greg

INSTRUCTIONAL ARRANGEMENT: Kidney-shaped table near bookcase

MATERIALS NEEDED: plastic dog, cat, apple, orange, horse, block

PROGRAM DESCRIPTION:

	SETTING			MOVEMENT	SUBSEQUENCE
	RESULTANTS OF PREV. NAT. SUBSQ.	VOCAL PROPERTIES	NON-VOCAL PROPERTIES		
LINE #1	Child with object in hand	"Put the ___ in the bag."	T holds out bag	S puts ___ in bag	(see next Line)
LINE #2	Object in bag	a. "Ready"--aim to phase out on successive trials b. ø	T holds item near right eye (attempt to move it closer to center of table on succes. trials.)	S directs eyes at T	(See next Line)
LINE #3	eye contact	a. "What's this?" + vocal model b."What's this?" + lip model c."What's this?" (attpt. to phase out models on repeated trials same obj.)	move item from position descrb. above to center of table	S directs eyes to ____ and says,"___"	Verbal praise T:"Yes, that's a ___." T gives item to child until next turn; T. goes to next child

SPECIAL CONSIDERATIONS:

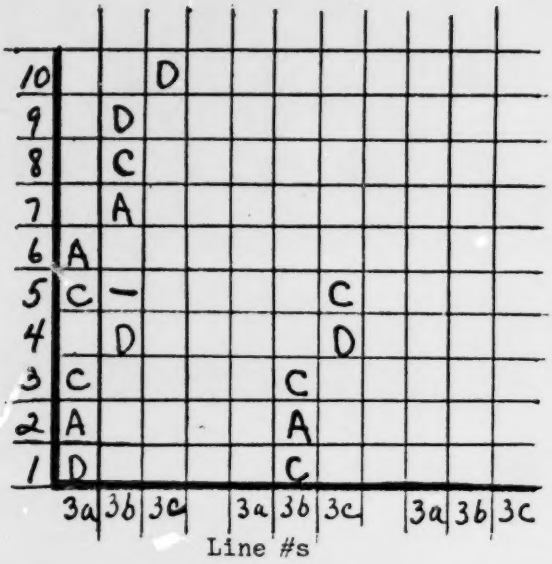
DATA: (See attached data sheets)

Figure 3
Program Record Sheet

PROGRAM DATA SHEET

DATE: 4/12/79

NAME: Nancy



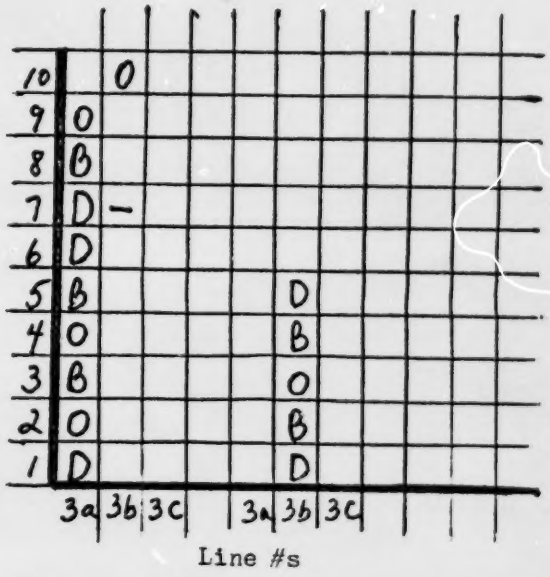
OTHER OBSERVATIONS:

Line #1: Put item in bag each time requested

Line #2: By trial 3 was able to hold item near center of table – e.c. was contingent upon "Ready" for remainder of trials

Line #3: increasing closer approximations to "dog" and "cat;" approx. to "apple" abt same throughout ("ap")

NAME: Greg



OTHER OBSERVATIONS:

Line #1: Put item in bag each time requested.

Line #2: Much difficulty holding for e.c. — Had to hold item near eye for each trial; eventually ended session based on extremely low prob. of ec. by the 15th trial

Line #3: all approximations remained at abt same level ("doh," "org" + "ba"), but solidly under control of lip model (a bit surprising considering Line #2).

Figure 4
Program Data Sheet

NAME: Brian Brown 18

PROGRAM: Coloring

4/9/79

Brian colored pictures of a banana, pear & apple. Change in setting — each was outlined in heavy lines. Banana & pear were black and the apple was ~~used~~ red in order to control for the choice of appropriate crayon. Before each page was given B, I asked "What color is a ——?" He answered "yellow" and "green" without models for banana and pear, respectively. He answered "red" for apple but it was under the control of question plus vocal model. He then picked out the appropriate color crayon from a huge box of crayons for each picture. No prompting necessary. Coloring was terrific! the heavier lines controlled more accurate movements of coloring within lines.

4/10/79

All pictures were outlined in black today and the outlines were slightly thinner than yesterday. He answered "What color is a —?" appropriately for all three fruits. "Red" for apple was the only one under the control of a model (lips). The rest of program went equally as well as yesterday. Tomorrow I'll try two pictures on one page.

Figure 5
Prose Recording Sheet

Example A:

SETTING	MOVEMENT	SUBSEQUENCE
Pictures of common objects (train, dog, ball, book, block, car); Asked the following questions by teachers, parents or siblings: "What's this?" "Tell me what this is," "What do I have here?"	Child names item presented.	Sounds of/name of item/; Verbal praise; Statement: "Yes, that's a _____;" And/or being given the actual object to play with.

Student will say the names of common objects (book, block, car, train, dog, ball) when presented with a picture of an object and asked either "What's this?", "Tell me what this is," or "What do I have here?" by any of his teachers, parents or siblings. Acceptable approximations will be followed by verbal praise, an expansion, and/or the presentation of the actual object.

Example B:

SETTING	MOVEMENT	SUBSEQUENCE
On swing; swing manager (teacher or peer) nearby; swing is slowing down.	Child says, "Push me."	Sounds of/push me/; Swing manager (teacher, peer) says, "OK" and gives swing a push.

Student will say "push me" to the swing manager (teacher or peer) when on the swing and the swing slows down. Manager will vocally acknowledge utterance and give swing a push.

Example C:

SETTING	MOVEMENT	SUBSEQUENCE
Student has completed previous trial 10 or fewer seconds ago in tutorial session with teacher; T directs eyes to student.	S directs eyes to teacher.	Eye contact; T begins next trial or task.

Student will make eye contact with the teacher within 10 seconds after completion of a trial in tutorial sessions with the teacher. Eye contact will be the occasion for the teacher to begin the next trial.

Example D:

SETTING	MOVEMENT	SUBSEQUENCE
Worksheet with four pairs of matching pictures, and a pencil on table; T says, "Draw lines between the matching animals."	Student picks up pencil, displays appropriate eye movements and draws appropriate lines.	Lines drawn; Verbal praise; Sticker put on paper.

In the presents of a worksheet with four pairs of matching pictures, a pencil and the instructions, "Draw lines between the matching animals," student will pick up pencil and draw lines between matching pictures. Teacher will praise student and put a sticker on correctly completed paper.

Figure 6
Sample of Three Term Objectives

The advantage to this procedure is the level of descriptive detail with which objectives are specified. The concept of setting and subsequences is likely to aid the teacher in delineating all the relevant conditions in which the targeted movements are to be displayed. In addition, the emphasis on natural subsequences and the notion of these subsequences becoming the setting of the next line of behavior highlight the natural conditions in which specific movements are to occur. Identifying these conditions represents a first step in a strategy for accomplishing generalization to appropriate natural environments, a step which may not be considered when using other formats.

Three term analysis is also a useful way of delineating objectives for activities which integrate behavioral skills from several developmental or curricular domains (gross/fine motor, cognitive, social, language/communication, self-help). The example in Figure 7 shows how one activity can be designed to contribute to the achievement of objectives from several curricular domains. A three term description of such activities clearly shows how the objectives relate to one another and yet how each can be independently and systematically established and advanced. In addition to increasing the pedagogical efficiency of any lesson, integrated activities enhance the functionality and generalization potential of the skills established, since integrated skills are usually required in natural settings. This is a major programming advancement over one objective-one activity teaching in which one activity is designed for each objective which is specified.

ANALYZING TASKS

After our teaching objectives are set, it is instrumental to analyze the objectives into smaller bits of behavior which can then be sequenced and systematically taught to the child. For example, our hypothetical teacher has

SETTING	MOVEMENT	SUBSEQUENCE
Student has completed previous task 10 or fewer seconds ago; T sitting across from student at table; T directs eyes to student.	S directs eyes to T.	Eye contact; Teacher presents sticker of a _____ and says, "What do I have here?"
	S says "_____."	Sounds of name; T says, "Right, that's a picture of a _____." Teacher then places sticker on table; and presents a worksheet with four pairs of matching pictures; she also puts a pencil on the table as she says, "Draw lines between the matching animals."
	Student picks up pencil, displays appropriate eye movements and draws lines between matching pictures.	Lines drawn; Verbal praise; Teacher picks up sticker and helps student put it on his paper.

Figure 7
Sample Activity which Integrates Objectives from Several Curricular Areas

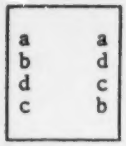
stated that one of her objectives for Donald for the year is that in the setting of a worksheet with four pairs of matching pictures, a pencil, and the instructions "Draw lines between the matching animals," Donald will pick up the pencil and draw lines between the matching pictures. This general objective can be written according to the three term format:

SETTING	MOVEMENT	SUBSEQUENCE
Donald seated at table; worksheet with 4 pairs of matching pictures on table; pencil on table; Teacher says: "Draw lines between the matching animals."	Donald picks up pencil, displays appropriate eye movements and draws appropriate lines.	Lines drawn between matching animals; Teacher praises Donald and hangs up worksheet.

The teacher's next step is to determine which behaviors she will need to teach Donald in order to reach this objective and the sequence in which they are to be taught. This planning procedure is often referred to as "task analysis."

Task analysis is usually accomplished by writing descriptions of what the student must do, that is, primarily descriptions of movements. When the three term format is employed, however, attention must also be paid to the settings and subsequences to those movements. This has several noteworthy advantages which we will discuss a bit later.

Let us take the example of Donald above and begin writing a task analysis in three terms. The three term analysis in figure 8 not only describes the stated objective in more detail, it also enables us to specify those individual behaviors which Donald must already display before he can meet the objective. In other words, this three term description includes a statement of the prerequisites to completing a simple worksheet. Sapon (1970) calls these behaviors RABs (pronounced "rabs"), short for Requisite Antecedent Behaviors.

SETTING	MOVEMENT	SUBSEQUENCE
Donald, one other student, and teacher sitting at a small table in a corner of the classroom; a worksheet is in front of Donald:  a,b,c,d = animals a pencil is beside it; Teacher says: "Donald, draw lines between the matching animals."	Donald directs his eyes at the pencil.	Pencil in Donald's field of view.
	Donald picks up pencil in his right hand.	Pencil held in Donald's right hand.
	Donald scans the two columns of animals.	Pictures of animals in Donald's field of view.
	Donald directs eyes to animal on left at top of page & places pencil point on upper left animal.	Donald's eyes directed at and pencil point on upper left animal.
	Donald's eyes move across the page as his right hand moves towards the matching animal.	Straight line appears on paper; one pair of matching animals are connected by a line.
	Donald raises right hand.	Pencil held above paper, point down.
	Donald directs eyes at second animal on the left.	Eyes directed at second animal on left.
	Donald places pencil point on second animal on left.	Pencil point on second animal on left.
	Donald's eyes move down and to the right as his right hand moves towards the matching animal.	Diagonal line appears on paper; second pair of matching animals are connected by a line.
	Donald raises right hand.	Pencil held above paper, point down.

ETC. until paper looks like this:

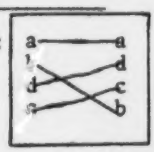


Figure 8
Example of a Task Analysis in Three Terms

Let us start at the beginning and identify the RABs to meeting the stated objective. Donald must be able to do the following things before he will successfully complete the worksheet:

1. Sit in his seat at a table with another student present;
2. Display eye movements which are directed towards stationary objects;
3. Pick up a pencil;
4. Hold a pencil correctly;
5. Place a pencil on a specified point;
6. Display the eye movements of scanning;
7. Draw a straight line between two items;
8. Select a matching item from an array of four; and
9. Draw a diagonal line between two items.

All of these RABs are evident in the three term analysis presented in Figure 8. We can now compare the three term description of Donald's entering behavior (Figure 2) with these RABs and decide at which point to begin our teaching program, that is, determine those behaviors which will represent our immediate objectives.

After reading the description of Donald's behavior in Figure 2, we see clearly that Donald already displays the RABs numbered 1 through 6. It is also apparent from the lines describing Donald's eye movements and the order in which he drew his circles that Donald displays RAB #8 (selecting a matching item from an array of four) as well. He does not, however, display RABs #7 and #9--drawing a straight line between two items and drawing a diagonal line between two items. Consequently, these two behaviors will be targeted as our teaching objectives. One possible strategy for reaching these objectives will be presented below in the section entitled Teaching Strategies.

One of the major advantages of this kind of task analysis is that the three term procedure permits increasingly detailed levels of analysis. For example, if Donald did not yet hold a pencil correctly (RAB #4), it would be possible to expand the three term description and write a more detailed analysis of the behaviors involved in holding a pencil. Figure 9 represents an example of this kind of analysis. This description would then enable the teacher to specify the RABs for appropriate pencil holding, and teaching could then begin on those RABs. On the other hand, since Donald does display all of the behaviors involved in pencil holding, the statement "Donald picks up pencil in his right hand" is written in sufficient detail. This flexibility in level of detail enables teachers to describe the behaviors of all of their pupils, regardless of their level of functioning. Broad analyses may be written when appropriate, and extremely detailed descriptions can also be prepared. The choice of level of detail depends on several factors, including the purpose of the description, the student's known learning patterns, and the teacher's history with regard to the particular student. This characteristic flexibility of three term analysis does not decrease the efficiency or reliability of the procedure. In fact, it is precisely this systematic flexibility which makes three term analysis an effective and responsive tool for teaching.

TEACHING STRATEGIES

Now that we have identified the behaviors which Donald must be taught and discussed Sapon's formulations regarding the effects of settings and subsequences on a student's movements, we are in a position to develop a teaching program. In keeping with his three term framework, Sapon (1972, 1976) defines a teacher as one who assumes the responsibility for arranging and managing the environment (both settings and sequences) so that his pupil comes to display the

SETTING	MOVEMENT	SUBSEQUENCE
Donald seated at a table; pencil is on table with point facing away from him; Teacher says: "Pick up the pencil."	Donald directs his eyes at the pencil.	Pencil in Donald's field of view.
	Donald raises right hand.	Donald's right hand above pencil, palm down.
	Donald lowers right hand a few inches.	Right fingers touching pencil.
	Donald moves thumb to right of pencil, index finger to left of pencil.	Donald's fingers around pencil; pencil between his index and middle finger; thumb leaning on table.
	Donald squeezes fingers together and bends thumb.	Pencil is held in Donald's right hand.
	Donald turns hand 90° to the right.	Pencil held in Donald's right hand; point down; Pencil is in proper position for writing.

Figure 9
A More Detailed Analysis of Pencil Holding

desired movements. This obliges a teacher to give careful consideration to the wide variety of environmental properties which are accessible to management and to arrange these properties accordingly.

Sapon and Kaczmarek (1975: 75) identify five general strategies. The reader will note that these teaching procedures are described using the same framework--the three term paradigm--as was used in discussing observing and recording behavior, specifying objectives, and task analysis.

1) Strengthening the same movements in a slightly different setting--Shifting Setting Control

2) Strengthening a set of successively closer approximations to the terminal objective in an identical setting (shaping)

3) Strengthening a slightly different set of movements in a slightly different setting

4) Strengthening the same set of movements in the same setting--Subsequence Control

5) Shifting specially-arranged settings and subsequences in the direction of natural and naturally-arranged antecedent and subsequent environments--Convergent Strategy (Sapon 1970).

Our sample strategy for teaching Donald to draw a straight line and a diagonal line between two items in the presence of a pencil, a worksheet with four matching pairs of animals, and the teacher's vocal instructions will primarily employ the first three strategies listed above.

In discussing specific arrangements of the environment, we will be referring to both setting controls and subsequence controls. Setting controls (Sapon 1973b) are systematic arrangements of the antecedent environment which either increase or decrease the probabilities of some movement. For example, at snacktime a teacher may present a vocal model following the question "What do you want?" while holding up a cookie. This setting control is designed to increase the probability of the child approximating "cookie." On the other

hand, a teacher may remove a particular item from a child's setting if this item has been observed to be the occasion for undesirable behaviors. This type of setting control is most effective when coupled with a management procedure which is designed to increase some specific, desirable set of movements.

Subsequence controls (Sapon 1973b) are systematic arrangements of the environment following a set of movements. The authors' use of the term will refer only to arrangements of the subsequence which are designed to increase the probabilities of a set of movements. Verbal praise, grades, presenting students with stickers, hanging students' work on bulletin boards, and providing an opportunity for students to engage in activities of their own choice are all examples of subsequence controls.

The strategy for Donald which will be discussed below will focus on setting controls. That is, the emphasis of our program with Donald will be to arrange the teaching setting in ways which will predictably increase the probabilities of Donald displaying the stated objectives.

In order to do this, we must study closely the setting in which Donald is expected to draw the specified lines. Prominent in this setting is the presence and content of the worksheet itself. It is through the use of worksheets that we will teach Donald to draw appropriate lines between matching items. We will design a set of worksheets that are sequenced in difficulty so that Donald will experience many small successes and yet be sufficiently challenged as he learns the RABs for completing our worksheet. Each of the steps in this teaching program are described in three terms on the following pages. It should be noted that there are several variations on these steps which would serve the purposes of this program equally as well. Three term analysis permits the design and inclusion of options into every teaching

program. The proposed interim objectives stand solely as an example of the formulation of a strategy in three terms. The reader is invited to contribute suggestions of their own into this proposed program for Donald.

First Interim Objective:

SETTING	MOVEMENT	SUBSEQUENCE
Donald, one other student and teacher seated at small table in a corner of the classroom; a worksheet is in front of Donald: a pencil is beside it; Teacher says: "Draw a line between the dots."	Donald picks up the pencil, directs his eyes at the paper, and draws a line between the dots.	Short line appears between dots on paper; Teacher acknowledges/praises Donald and presents another similar sheet.

The teacher has several options open at this point in the program. If the vocal instructions and the placement of the dots are not effective setting controls, the teacher may want to add one or more of the following: 1) Place a finger of each hand on the outside of each dot to serve as an additional visual control; 2) Ask Donald to point to each dot before drawing the line; 3) Use her index finger as a moving guide and instruct Donald to follow her finger with the pencil. In each of these options, the teacher must be prepared to shift the setting gradually so that eventually, Donald will draw the line in the setting specified above. At the same time, the teacher can be shaping the quality of the line Donald draws. For example, Donald's first line between the two points placed close together may be slightly crooked or wavy and may be drawn under the control of the teacher's fingers placed on either side of the dot. If this is the case, the program will then have to

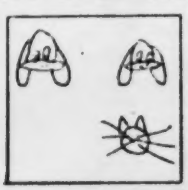
emphasize simultaneously both the quality of Donald's line and the setting in which it is drawn.

Second Interim Objective:

SETTING	MOVEMENT	SUBSEQUENCE
Sams as above except worksheet in front of Donald is as follows:	Donald picks up the pencil, directs his eyes at the paper, and draws a line between the dots.	Line appears between dots on paper; Teacher acknowledges/praises Donald and presents another similar sheet, terminates activity or presents some other arranged subsequence.

We see in this objective that the only change in programming is the length of the line Donald must draw; that is, the setting differs slightly in that the dots are placed farther apart than in the first interim objective. It should be apparent that the teacher can present to Donald a series of worksheets which call for increasingly longer lines without raising the contingencies too drastically at any one point. All of the options (and others) discussed regarding the first interim objective are also applicable here. At this point it is possible for the teacher to begin altering the worksheets slightly so that the item variety is increased. In other words, worksheets may now consist of two matching animals instead of the simple points used in the first objective. The purpose of this is to increase the number and variety of settings in which Donald draws a straight line. This will facilitate the teaching of the more advanced objectives later on.

Third Interim Objective:

SETTING	MOVEMENT	SUBSEQUENCE
Same as above except worksheet is as follows: 	Same as above.	Line appears on paper between matching items; same as above.

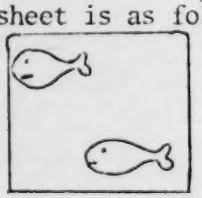
At this stage of the program it is instrumental to add distractors to the worksheet, that is, to alter the setting again in the direction of the terminal objective. As in the second objective, it is important that the items and placement of the items on the page vary with each worksheet.

Fourth Interim Objective:

SETTING	MOVEMENT	SUBSEQUENCE
Same as above except worksheet is as follows:	Donald picks up the pencil, directs his eyes at the paper, scans the paper, and draws two lines between the matching items.	Two lines appear on the page; matching items are connected; same as above.

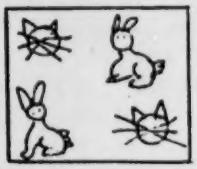
With the commencement of work on this objective, Donald is now drawing two straight lines between matching items. The lines, as suggested above, do not cross, since Donald has not yet been taught to draw diagonal lines. It would have also been acceptable had our hypothetical teacher decided to teach Donald to draw a diagonal line before requiring him to draw two lines. The order of these two objectives is flexible since neither is a RAB for the other.

Fifth Interim Objective:

SETTING	MOVEMENT	SUBSEQUENCE
Same as above except worksheet is as follows: 	Same as above except Donald's eyes and hand move diagonally to the right.	Diagonal line appears on the page; matching items are connected; same as above.

Since the change in this particular setting is more obvious than the settings of the first four objectives, the teacher may choose to begin with the items closer together and gradually increase the distance between them. This again depends on Donald's performance.

Sixth Interim Objective:

SETTING	MOVEMENT	SUBSEQUENCE
Same as above except worksheet is as follows: 	Same as above except Donald draws two diagonal lines between the matching items.	Two diagonal lines appear on the page; matching items are connected; same as above.

This objective is clearly a combination of the fourth and fifth interim objectives. Donald's performance is more and more closely approximating the terminal objective of drawing lines between four pairs of matching animals.

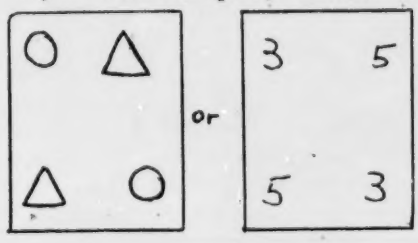
Seventh Interim Objective:

SETTING	MOVEMENT	SUBSEQUENCE
Same as above except worksheet is as follows:	Same as above except Donald draws two diagonal lines and one straight line between the matching items.	Two diagonal lines and one straight line appear on page; same as above.

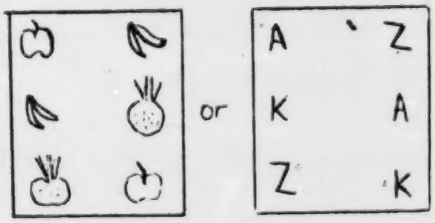
The movements which Donald is required to display and the settings in which they are displayed are becoming increasingly more complex. The arrangement of the items on the page can be varied with each worksheet so that the combination of diagonal and straight lines which Donald draws also varies.

The reader is most likely able to specify the eighth and ninth interim objectives at this point. The teacher can introduce worksheets in which Donald must draw three lines which all cross each other. A fourth pair of matching items can be added; the manner in which they are added will depend on Donald's past performance and the teacher's predictions as to the amount of setting control he requires at this point in the program.

A strategy of this kind is easily modified to include work on additional objectives as well. There is no rule which says line drawing and the completion of worksheets must be taught using pictures of animals. If it has also been determined that Donald needs to be taught to match colors, shapes, items which "go together," or any of a host of behaviors, the teacher would find it very easy to integrate such objectives with the line drawing program. This could be done at several points along the way. For example, worksheets for the sixth interim objective could look like this:



Worksheets for the eighth objective may look like this:



This lengthy, but only introductory discussion on teaching strategies was designed to illustrate three major points: 1) The kinds of analysis made possible by the three term procedure; 2) the structure and flexibility afforded by this paradigm; and 3) the consistency and continuity between observing and recording behavior (including initial assessments), specifying objectives, analyzing tasks, and planning teaching strategies which is possible when three term analysis is employed.

EVALUATION

An integral part of any instructional program is evaluation; that is, determining how successful one's teaching efforts have been. Evaluation is dependent upon data gathered during program implementation and provides the

basis for modifying aspects of the instructional program. Since the ultimate criterion for effective teaching is whether or not the student has been successful in achieving the specified objective(s), evaluation must be interwoven with on-going informal assessment; therefore evaluation must also be on-going.

Because three term analysis attunes the teacher to the detailed properties of the environment, it affords the teacher the opportunity to evaluate and modify aspects of the instructional program not only on a daily basis, i.e., following each day's administration of the program, but also continuously, i.e., while the teacher is actually engaged in the pedagogical interactions. In essence, the teacher strives to make subtle, but systematic changes in each program trial so that he is providing the occasion for the student to display behaviors which are constantly moving in the direction of the terminal objective. These decisions to change an aspect of setting and subsequence, to raise or lower the requirements for the arranged subsequence, or to end the lesson are based upon student behaviors displayed earlier in the lesson as well as the teacher's knowledge of those students' behaviors in similar lessons and other settings. This process of evaluation and modification, called on-line analysis, can best be summarized by its formal definition (Kaczmarek, 1977):

> Changing the immediately available properties of the environment
>
> according to previously displayed lines of behavior
>
> so that the student displays successive approximations to the terminal objective.

This on-line analysis permits the teacher to review continually the originally planned strategy and compare it with the actual behavior of her pupil. As the reader can see, we have now come full circle and are back to the point of observing and recording behavior.

It is precisely this circular (that is, non-linear) nature of the teaching process which makes three term analysis an effective and useful procedure. Although this paper represents only an introduction to this framework of analysis, the reader will, it is hoped, recognize the coherence and continuity which is brought to program planning and implementation when three term analysis is employed. This consistency across planning steps contributes to the resolution of some of the problems identified in the beginning of this paper.

Three term analysis enables a teacher to describe, attend to, and analyze a substantial amount of the vital information about a student's behavior which becomes available during assessment and/or program implementation. The attention to detailed descriptions of the settings and subsequences to movements leads to the inclusion of all aspects of the conditions under which a behavior is expected to be displayed when objectives are being specified. Three term analysis is designed to aid the teacher in planning activities which integrate objectives across skill areas. This characteristic of the framework leads teachers away from the limitations of one objective-one activity teaching. Finally, the three term paradigm has important implications for the usually difficult procedure of on-going evaluation. Future work on relating three term analysis to the teaching of handicapped individuals will be directed towards further resolution of such problems in program planning and implementation.

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